



# PMCQ

## EVAPORATIVE CONDENSERS

**NEW!**



**ENERGY SAVING, EASY TO INSTALL AND MAINTAIN, FORCED DRAFT  
AXIAL SUPER LOW SOUND FAN CONDENSERS**

*DELIVERING QUALITY... FOCUSED ON PERFECTION!*

**CERTIFIED EN ISO 9001**



**IARW** International Association of  
Refrigerated Warehouses

**iiar** MEMBER  
International  
Institute of  
Ammonia Refrigeration

**euramm@n**  
refrigerants delivered by mother nature



# PMICQ



**S**ince its founding in 1976, EVAPCO, Inc. has become a world-wide leader in supplying quality cooling equipment for thousands of customers in both the commercial and industrial markets.

EVAPCO's success has been the result of a continual commitment to product improvement, quality workmanship and a dedication to providing unparalleled service.



Our emphasis on research and development has led to many product innovations – a hallmark of EVAPCO through the years.

The ongoing R & D Program enables EVAPCO to provide the most advanced products in the industry – technology for the future, available today.

With 19 facilities in 9 countries and over 175 sales offices in 51 countries world-wide, EVAPCO is ready to assist in all your equipment needs.

## EVAPCO is proud to introduce the Super Low Sound Technology for Forced Draft Axial Fan Condensers



**NEW**

### Super Low Sound Fan Technology -

- One Piece Molded Heavy Duty FRP Construction
- Sound level reduction 10-13 dBA on fan side @ 15 m

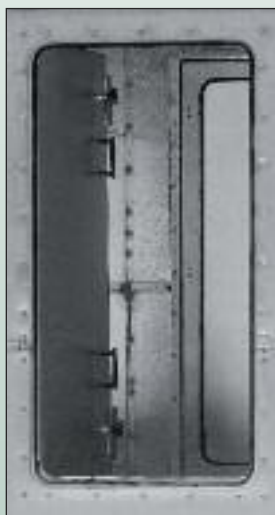
## PVC Water Distribution with ZM II™ Nozzles

- Large orifice prevents clogging (no moving parts)
- Threaded nozzles eliminate troublesome grommets
- Fixed position require zero maintenance
- Threaded end caps for ease of cleaning

## Thermal Pak II Heat Transfer Technology

- Patented design
- More surface area per plan area than competitive designs
- Improved heat transfer efficiency due to tube geometry and orientation of tubes
- Lower refrigerant charge

U.S. Patent No. 4755331



Standard Man-sized Access Door

**NEW**

### Standard Man Size Access Door

- Enhanced Basin Accessibility
- Easy Basin Cleaning
- Easy Access to Internal Components



# PMcq

## DESIGN AND CONSTRUCTION FEATURES

EVAPCO is proud to introduce the latest in evaporative condenser technology, the PMcq. This Evaporative Condenser features Quiet Super Low Sound Technology and is Easy to install, Easy to maintain and Energy Saving!



### Water Saver Drift Eliminators

- New patented design reduces drift rate to 0.001%
- Saves water and reduces water treatment cost
- Greater structural integrity vs. old style blade-type
- Recessed into casing for greater protection
- Drift rate certifications as per Eurovent OM-14-2009



### Double-Break Flange Joints

- Stronger than single-brake designs by others
- Minimizes water leaks at field joints
- Greater structural integrity

### NEW

### Unique Field Seam

- Eliminates up to 85% of fasteners
- Self guiding channels improve quality of field seam to eliminate leaks
- Easy to install
- Lower installation cost

### NEW

### Individual Fan Drive System - STANDARD

- Increased flexibility for improved capacity control
- Greater reliability through redundancy
- Easy motor replacement
- Front mounted drives for improved maintenance accessibility

### NEW

### Improved Water Distribution Piping

- Horizontally mounted pumps allow for reduced basin water level\*
- Simplified piping for easier basin access
- Totally enclosed pump motors assure long, trouble-free life

\* Refer to engineering data for availability

### NEW

### Sloped Pan Bottom

- Pan bottom slopes to drain
- Easy to clean
- Stainless steel strainer resists corrosion



### Proven Performance & Design Flexibility

The new PMCQ Evaporative Condenser offers more capacity and greater system design flexibility than ever before. EVAPCO's research and development team has invested hundreds of hours in laboratory testing to develop the next generation in Forced Draft Condenser Technology. These efforts have produced a totally new fan section design which is now combined with the proven Thermal-Pak II® coil technology to offer improved condenser performance.

The PMCQ features more plan area options and fan horsepower options for the system design engineer. With more condenser capacity, more plan area options and greater flexibility in motor selection, the design engineer can now match the condenser performance to the specific application requirements. More equipment choices and more design flexibility mean greater value for the End-User.



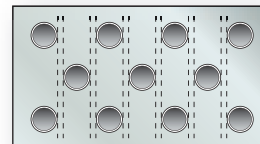
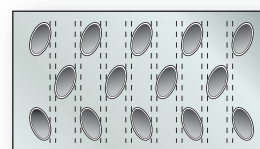
### Patented Thermal-Pak II® Coil Design

#### Lower Refrigerant Charge

Only EVAPCO condensers offer the patented\* Thermal-Pak II® Coil which assures greater operating efficiency in your condenser. Its unique elliptical tube design allows for closer tube spacing resulting in more surface area per plan area than traditional round tube designs. The Thermal-Pak II® Coil design has lower resistance to air flow and permits greater water loading, making the Thermal-Pak II® Coil the most efficient design available. And now with its new tube circuiting and orientation pattern, the Thermal-Pak II® coil yields a lower refrigerant charge.

\*U.S. Patent No. 4755331

Thermal-Pak® II Coil by EVAPCO



Round Tube Coil by Others

### Energy Efficient for Lowest Operating Cost

#### Lower Horsepower Options

The new fan drive system of the PMCQ utilizes large diameter super low sound fans in a vane-fan arrangement to provide more efficient air flow and reduced power consumption. When compared to the traditional centrifugal fan condenser models, the vane-axial fan design can offer up to a 50% reduction in energy consumption. And, with the new PMCQ model selections even more low horsepower options are available to obtain greater energy savings.

### Individual Fan Drive System

#### Capacity Control Flexibility & Operating Redundancy

The new PMCQ fan drive system provides individual motor to fan configuration as standard equipment on all models. The dedicated fan to motor arrangement ensures less "wear & tear" on the drive system versus tandem fan motor drive arrangements resulting in less maintenance. The individual motor to fan design offers greater capacity control flexibility to match the system load requirements. In addition, all Evapco condensers are equipped with an internal baffle system which extends from the pan bottom vertically through the coil bundle. This unique design allows the user to cycle fan motors independently without harmful effects of air by-pass inside the unit. The individual motor to fan design ensures maximum operating redundancy in the condenser fan system when critical operation is necessary.

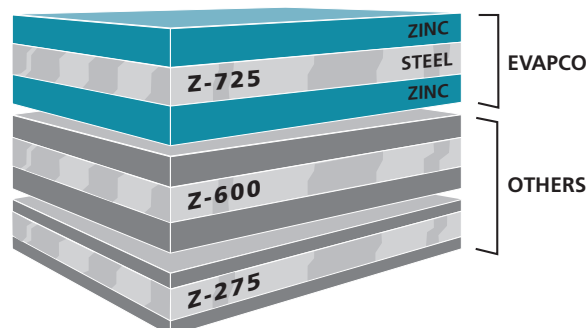


## DESIGN FEATURES

### EVAPCOAT Corrosion Protection System

The Z-725 Mill Hot-Dip Galvanized Steel Construction is the heaviest level of galvanizing available for manufacturing evaporative condensers and has more zinc protection than competitive designs using Z-275 and Z-600 steel.

There are various grades of mill galvanized steel each with differing amounts of zinc protection. EVAPCO has been a leader in the industry in developing heavier galvanizing, and was the first to standardize on Z-725 mill hot-dip galvanized steel. Z-725 designation means there is a minimum of 725 g/m<sup>2</sup> total zinc present on the steel. During fabrication, all panel edges are coated with a 95% pure zinc-rich compound for extended corrosion resistance.



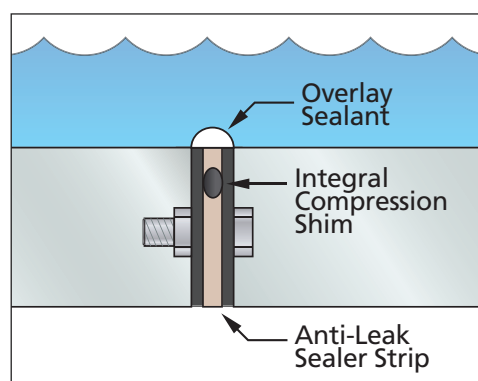
### 85% Fewer Fasteners Lower Installed Cost

The PMCQ features a new field seam design which ensures easier assembly and fewer field seam leaks. The field seam incorporates new self-guiding channels to guide the coil casing section into position and set in place on the bottom fan section of the condenser. In addition, the new design eliminates up to 85% of the fasteners typically used to join the condenser sections in the field significantly reducing the contractor labor costs for installation.



### Unique Seam Design—Eliminate Field Leaks

The new PMCQ features Evapco's unique panel construction design which includes a special butyl tape sealer with an integral sealing gasket. Each joint is then backed with a secondary caulking compound and encased in a double-brake flange for added strength and structural integrity. This unique sealing system has been proven effective in both laboratory tests and years of field application.



### Superior Water Saver Drift Eliminators

The PMCQ condensers incorporate a patented\* highly efficient PVC drift eliminator. The eliminator removes entrained water droplets from the air stream to limit the drift rate to less than 0.001% of the recirculating water rate. The efficiency of the eliminators is certified by Eurovent and tested in accordance with OM-14-2009. Please consult [www.eurovent-certification.com](http://www.eurovent-certification.com) for additional informations.

With a low drift rate, PMCQ condensers save valuable water and water treatment chemicals. The eliminators feature a honeycomb design which offers greater structural integrity and are recessed in the top of the casing and UV protected for longer life. They are constructed of inert polyvinyl chloride (PVC) which eliminates corrosion in this critical area of the condenser. The eliminators are assembled in sections for easy handling and removal for coil and water distribution system inspection.



\*U.S. Patent No. 631580481

### Improved Maintenance

#### Oversized Access Door

For enhanced basin accessibility, the Oversized Access Doors enable maintenance personnel to quickly and easily enter the basin for float valve adjustment and unit inspection, cleaning and maintenance.

#### Fan Drive Accessibility

The drive components of the PMcq are easily accessed for routine maintenance from the front of the unit. Bearing grease fittings are extended to the outside of the unit for ease of lubrication. All drive sheaves have been relocated to the front of the fan section and motors are positioned on a platform base to allow for easy belt tension adjustment.



#### Easy Clean Sloped Basin

The PMcq drain pan is designed to improve maintenance access and make it easier for operating technicians to clean. The bottom of the pan is sloped to the unit drain to ensure that the basin will completely drain and allow sediment and debris that may collect in the basin to be easily flushed from the unit. The design helps to prevent buildup of sedimentary deposits, biological films and standing water.

#### Pressurized Water Distribution System

The water distribution system is made of schedule 40 PVC pipe and ABS plastic water diffusers for corrosion protection in this key area. The piping is easily removable for cleaning. The water diffusers have a large orifice and are practically impossible to clog. They also have an anti-sludge ring extending into the headers to prevent sediment from building up in the diffuser opening. In addition, the spray branches have threaded end caps to allow easy debris removal. All PMcq units have as per standard the ZM II™ Nozzle to ensure that every square meter of heat transfer surface receives complete and even water coverage, resulting in maximum thermal performance.



ZM II™ Nozzle

### Clean Pan Basin Design

The basin of the New PMcq is sloped toward a depressed area where the drain is located. With the "Clean Pan" design, it is easy for a service mechanic to flush the pan.



### Stainless Steel Strainers

The EVAPCO standard for many years, the stainless steel strainer is one component that is subject to excessive wear and corrosion. With stainless steel construction, this component will last the life of the unit.



## OPTIONAL EQUIPMENT

### Two Speed Motors

Two speed fan motors can provide an excellent means of capacity control. In periods of lightened loads or reduced wet bulb temperatures, the fans can operate at low speed, which will provide about 60% of full speed capacity, yet consume only about 15% of the power compared with high speed. In addition to the energy savings, the sound levels of the units will be greatly reduced at low speed.

### Inverter Duty Fan Motors

Inverter Duty Fan Motors are available for condenser applications which utilize variable frequency drive systems for capacity control. Inverter Duty Fan Motors offer totally enclosed premium efficiency construction which is designed for variable frequency drive applications.

Note: Other special motor configurations are available to meet specific proper requirements. Contact your local EVAPCO sales representative for application assistance and motor availability.

### Remote Sump Configuration

For units operating in areas where temperatures may be very low, or where low temperatures may occur during periods when the unit is not operating, a sump located inside the building is the preferred means of ensuring that the basin water will not freeze. For these applications, the condenser will be supplied without the spray pump, suction strainers and all associated piping, but with an oversize bottom outlet.

### Electric Water Level Control

Evaporative condensers may be ordered with an electric water level control in lieu of the standard mechanical float and make-up assembly. This package provides accurate control of water levels and does not require field adjustment.

### Multiple Circuit Coils

Condensers may be supplied with multiple circuit coils to match various system requirements such as split systems, or if a glycol or water circuit is desired for compressor head cooling.

### Basin Heater Package

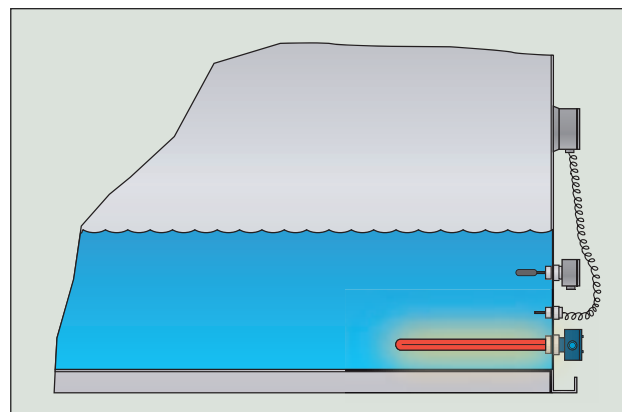
If a remote sump configuration is not practical, electric basin heater packages are available to help prevent freeze-up of the basin water. The packages include electric heater elements, and a combination thermostat/low water cutoff.

**Note: External pumps should be heat traced and insulated in the field to prevent freezing.**

### Electric Heaters

Electric immersion heaters are available factory installed in the basin of the condenser. They are sized to maintain a +5°C pan water temperature with the fans off and an ambient air temperature of -18°C. They are furnished with a combination thermostat/low water protection device to cycle the heater on when required and to prevent the heater elements from energizing unless they are completely submerged. All components are in weather proof enclosures for outdoor use. The heater power contactors and electric wiring are not included as standard.

PMCQ Heater Power	
Models	kW
PMCQ-316 to PMCQ-493	8
PMCQ-476 to PMCQ-740	12
PMCQ-734 to PMCQ-986	16
PMCQ-952 to PMCQ-1480	24
PMCQ-399 to PMCQ-561	10
PMCQ-603 to PMCQ-845	14
PMCQ-765 to PMCQ-893	16
PMCQ-798 to PMCQ-1122	18
PMCQ-1206 to PMCQ-1690	30
PMCQ-1618 & PMCQ-1786	30

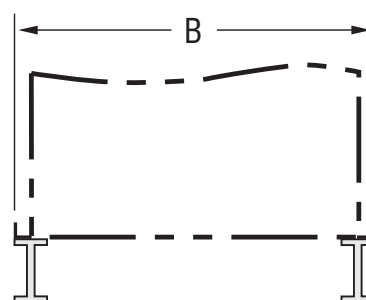
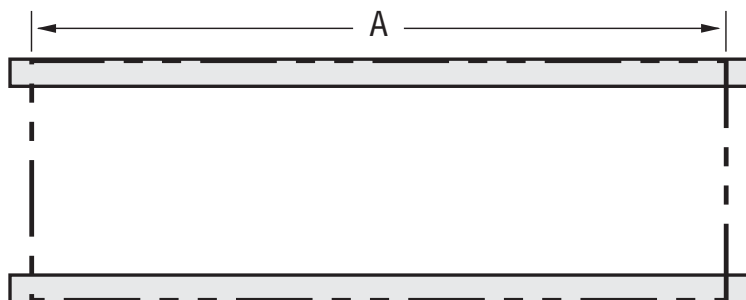


### Steel Support

The recommended support for EVAPCO condensers is structural "I" beams located under the outer flanges and running the entire length of the unit. Mounting holes, 19 mm in diameter are located in the bottom channels of the pan section to provide for bolting to the structural steel. (Refer to certified drawings from the factory for bolt hole locations.)

Beams should be level to within 3 mm in 1,8 m before setting the unit in place. Do not level the unit by shimming between it and the "I" beams as this will not provide proper longitudinal support.

PMCQ Dimensions (mm)		
3 m Wide Models	A	B
PMCQ-316 to PMCQ-493	3651	2990
PMCQ-476 to PMCQ-740	5490	2990
PMCQ-734 to PMCQ-986	7337	2990
PMCQ-952 to PMCQ-1480	11024	2990
3,6 m Wide Models	A	B
PMCQ-399 to PMCQ-561	3651	3616
PMCQ-603 to PMCQ-845	5490	3616
PMCQ-765 to PMCQ-893	6102	3616
PMCQ-798 to PMCQ-1122	7337	3616
PMCQ-1206 to PMCQ-1690	11024	3616
PMCQ-1618 & PMCQ-1786	12243	3616







## Super Low Sound Technology on Evaporative Condensers

PMCA Condenser  
is now available with  
Super Low Sound fans  
to reduce the overall  
sound and  
improve the  
energy  
consumption  
by 50%  
compared to  
conventional  
centrifugal fan  
condensers.



## Ultra Quiet operation for Forced Draft Counterflow Evaporative Condensers

### Solutions for Saving Energy and Sound Sensitive Applications

The NEW **PMCQ** Condenser comes standard with Super Low Sound Fans. They reduce the overall sound generation compared to forced draft centrifugal condensers, and additionally reduce the energy consumption by 50%. Consult EVAPCO's selection software for unit sound levels. If a detailed analysis or full octave band datasheet is required for your application, please consult your EVAPCO Sales Representative.



### Reduced Sound Levels and Reduced Energy Consumption versus Centrifugal Fan Units

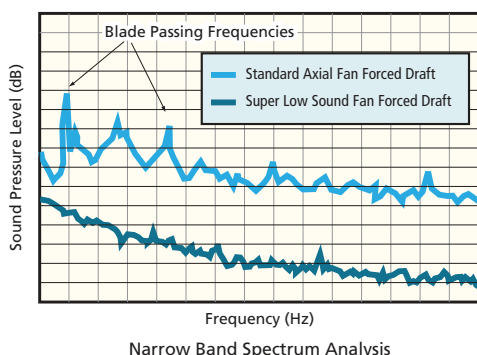
EVAPCO's Super Low Sound Fan on the **PMCQ** condensers utilizes an extremely wide chord blade design available for sound sensitive applications where the lowest sound levels are desired. The fan is one piece molded heavy duty FRP construction utilizing a forward swept blade design.

### Improved Sound Quality versus standard straight bladed axial fan types

The SUPER Low Sound Fan on the **PMCQ** condensers reduces sound levels 10 to 13 dB(A) and eliminates audible blade passing frequencies indicative of straight bladed axial type fans. Refer to the Narrow Band Spectrum graph which shows how straight bladed axial fans produce blade passing frequencies – the same phenomena that produce the signature pulsating helicopter noise.

The blade passing frequencies are audible spikes in sound pressure levels, but are not apparent in the octave band sound spectrum.

The Super Low Sound Fan on the **PMCQ** Condenser reduces sound levels and fan power without compromising the sound quality!



### PMCQ / LSCB Sound Comparisons

Model No.	Fan Motor Power	Sound Pressure Levels				
		End	Fan Side	Opp. End	Opp. Fan Side	Top
LSCB-400	22	58	66	57	56	63
PMCQ-405	11	57	66	57	57	62
LSCB-625	37	59	66	59	56	63
PMCQ-613	22	59	69	59	58	63

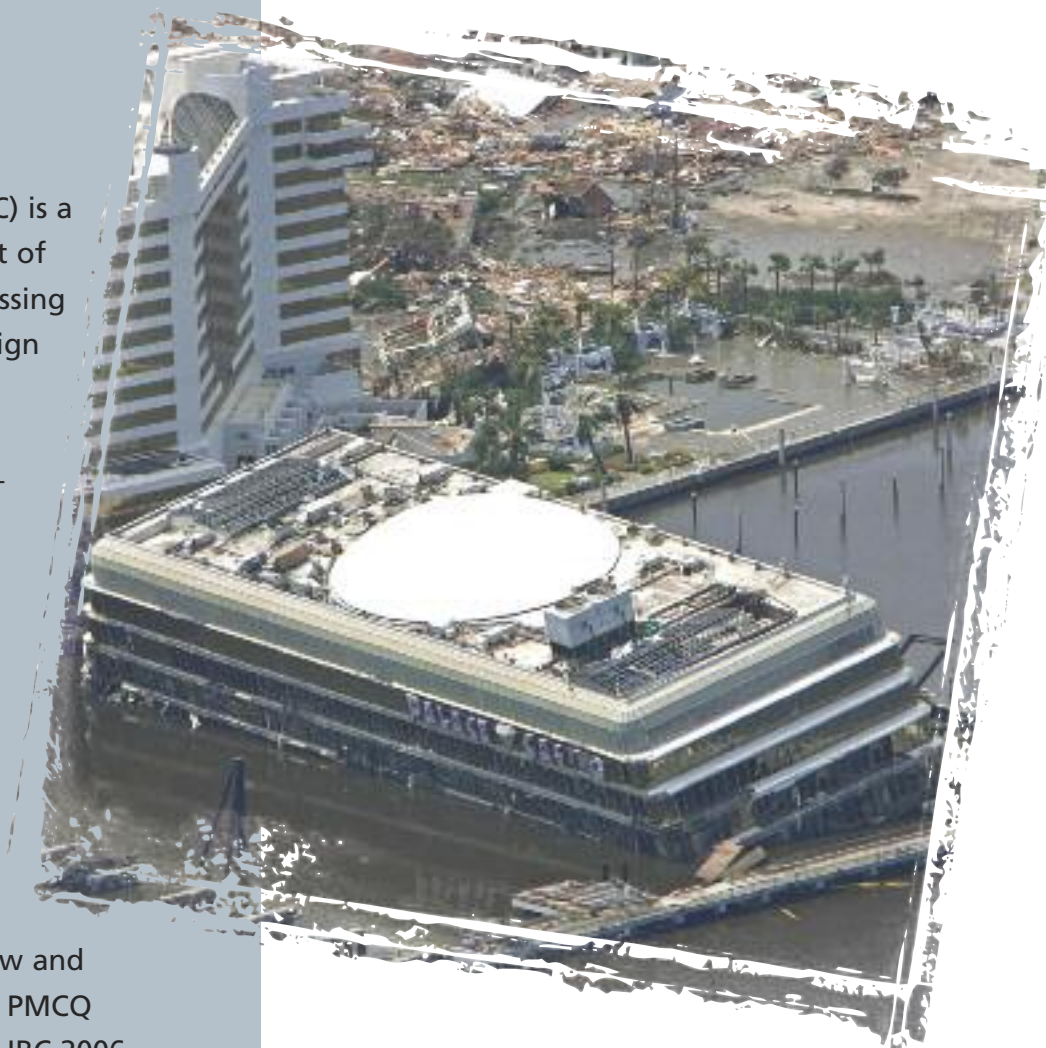
**NOTE:** Sound pressure levels in dBA 15 m from source

- Reduced energy consumption compared to Forced Draft Centrifugal Condensers
- Typical sound values equal or lower than Forced Draft Centrifugal Condensers of similar size

# We Stand Tall Through it All!

The International Building Code (IBC) is a comprehensive set of regulations addressing the structural design and installation requirements for building systems – including HVAC and industrial refrigeration equipment.

With the advent of the IBC, EVAPCO is proud to introduce the new and improved line of PMCQ Condensers with IBC 2006 compliance standard.



## Wind, Rain, Earthquake and Hurricane

*EVAPCO Condensers... designed to  
withstand seismic or wind load forces.*

In its continuing commitment to be the leaders in evaporative cooling equipment design and services, EVAPCO PMCQ Condensers are now **Independently Certified** to withstand Seismic and Wind Loads in accordance with IBC 2006.

## What is IBC?

### International Building Code

The International Building Code (IBC) is a comprehensive set of regulations addressing both the structural design and the installation requirements for building systems – including HVAC and industrial refrigeration equipment.

Compared to previous building codes that considered only the building structure and component anchorage, the requirements contained within the IBC address anchorage, structural integrity, and the operational capability of a component following either a seismic or wind load event. **Simply stated, the IBC code provisions require that evaporative cooling equipment, and all other components permanently installed on a structure, must be designed to meet the same seismic or wind load forces as the building to which they are attached.**

### How Does IBC 2006 Apply to Condenser?

Based on site design factors, calculations are made to determine the equivalent seismic “g force” and wind load (kilo-Newton per square meter, kN/m<sup>2</sup>) on the unit. The cooling tower must be designed to withstand the greater of either the seismic or wind load.

All locations with design criteria resulting in a seismic design force of up to 1.0g or a wind load of 2,87 kN/m<sup>2</sup> or below will be provided with the standard PMCQ structural design. An upgraded structural design is available for installations with design criteria resulting in “g forces” greater than 1.0g. The highest “g force” location in North America is 5.12g. The highest wind load shown on the maps is 273 km/h, which is approximately equal to 6,94 kN/m<sup>2</sup> velocity pressure.

**Therefore, the upgraded structural design package option for the New PMCQ is designed for 5.12 g and 6,94 kN/m<sup>2</sup> making it applicable to most building locations all over the World.**

### Design Implementation

EVAPCO applies the seismic design and wind load information provided for the project to determine the equipment design necessary to meet IBC requirements. This process ensures that the mechanical equipment and its components are compliant per the provisions of the IBC as given in the plans and specifications for the project.

### Independent Certification

Although the IBC references and is based on the structural building code ASCE 7, many chapters and paragraphs of ASCE 7 are superseded by the IBC, independent certification and methods of analysis are such paragraphs. Per the most recent edition of the code, the EVAPCO compliance process included an

exhaustive analysis by an independent approval agency. As required by the International Building Code, EVAPCO supplies a certificate of compliance as part of its submittal documents. The certificate of compliance demonstrates that the equipment has been independently tested and analyzed in accordance with the IBC seismic and wind load requirements. Evapco has worked closely with the independent approval agency, The VMC Group, to complete the independent equipment testing and analysis.

If the seismic “g force” or wind load requirements for the project site are known, EVAPCO's online equipment selection software, iES, will allow you to choose the required structural design package – either standard construction or upgraded construction.

For further questions regarding IBC compliance, please contact your local EVAPCO Representative.





# Engineering Data



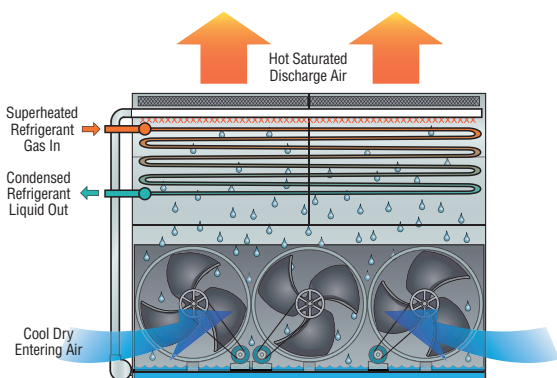
## Dimensions

## Principle of Operation

The refrigerant gas is discharged from the compressor into the inlet connection of the evaporative condenser. Water from the condenser's sump is continuously flooded over the condenser coil, while ambient air is simultaneously forced into the unit. As the ambient air moves up through the coil section, a portion of the spray water is evaporated into the air stream.

The evaporative process cools the spray water, which in turn cools the tubes containing the refrigerant gas. The cool tube walls cause the refrigerant gas to give up heat and condense into a liquid. The condensed liquid flows out of the coil's sloping tubes to the high pressure liquid receiver for return to the system.

The hot, saturated air is driven through the drift eliminators, where any entrained water droplets are removed. The condenser's fan then discharges this air stream out of the top of the unit at a high velocity, where it can dissipate harmlessly into the atmosphere. The water which was not evaporated falls into the sump and is recirculated by the spray pump to the water distribution system above the condensing coil section.



Principle of Operation

## Selection Procedure

Two methods of selection are presented, the first is based on the total heat of rejection as described immediately below. The second and more simple method is based on evaporator tons. The evaporator ton method is only applicable to systems with open type reciprocating compressors.

The heat of rejection method is applicable to all but centrifugal compressor applications and is normally used for selecting evaporative condensers for use with hermetic compressors and screw compressors. It can also be used for standard open type reciprocating compressors as an alternate to the evaporator ton method.

The evaporator ton method is based on the estimated heat of compression. **The heat of rejection method of selection is more accurate and should be used whenever possible.**

Refer to the factory for selections on systems with centrifugal compressors.

## Heat of Rejection Method

In the heat of rejection method, a factor for the specified operating conditions (condensing temperature and wet bulb) is obtained from Table 1 or 2 and multiplied times the heat of rejection.

The resultant figure is used to select a unit from Table 3. Unit capacities are given in Table 3 in kW.

If the heat of rejection is not known, it can be determined by one of the following formulas:

### Open Compressors:

Heat of Rejection = Evaporator Load (kW) + Compressor kW

### Hermetic Compressors:

Heat of Rejection = Evaporator Load (kW) + Compressor Input kW

### EXAMPLE

Given: 1000 kW evaporator load, ammonia refrigerant  
36°C condensing temperature, 26°C wet bulb  
temperature with a 300 kW compressor.

Selection:	Evaporator Load	=	1000 kW
	Compressor Load	=	300 kW
	Total	=	1300 kW
			Heat of Rejection

From Table 2, the capacity factor for 36°C condensing temperature and 26°C wet bulb temperature = 1.39

1300		1.39		1807
(Total Heat of Rejection)	x	(Capacity Factor)	=	(Corrected Heat Rejection Load)

Therefore, select **PMQC-434**

Note: For screw compressor selections employing water cooled oil cooling, select a condenser for the total kW as in the example. The condenser can then function in one of two ways:

- (1) Recirculating water from the water sump can be used directly in the oil cooler. A separate pump should be employed and the return water should be directed into the water sump at the opposite end from the pump suction.
- (2) The condenser coil can be circuited so that water or a glycol-water mixture for the oil cooler can be cooled in a separate section of the coil. Specify load and water flow required.

For refrigerant injection cooled screw compressors, select the condenser in the same manner as shown in the example.

If the oil cooler is supplied by water from a separate source, then the oil cooling load should be deducted from the heat of rejection before making the selection.

# ENGINEERING DATA & DIMENSIONS

# PMCQ

## SELECTION PROCEDURE

**Table 1 - HCFC-22 and HFC-134a Heat Rejection Factors**

Condensing Pres. psig		Cond. Temp. °C	Wet Bulb Temperature, (°C)																	
HCFC-22	HFC-134a		10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1090	669	30	1,07	1,15	1,25	1,38	1,47	1,57	1,69	1,83	2,00	2,23	2,50	2,86	3,36	—	—	—	—	—
1154	718	32	0,94	1,01	1,09	1,19	1,26	1,32	1,40	1,49	1,60	1,74	1,90	2,11	2,36	—	—	—	—	—
1220	759	34	0,85	0,90	0,97	1,04	1,09	1,14	1,20	1,26	1,34	1,43	1,54	1,66	1,81	2,02	2,31	—	—	—
1253	785	35	0,80	0,85	0,91	0,97	1,02	1,06	1,11	1,15	1,21	1,29	1,37	1,46	1,56	1,71	1,89	2,13	2,41	2,77
1287	814	36	0,77	0,81	0,86	0,92	0,96	1,00	1,04	1,07	1,13	1,19	1,26	1,34	1,43	1,56	1,71	1,90	2,14	2,43
1359	856	38	0,70	0,74	0,78	0,82	0,85	0,86	0,90	0,93	0,96	1,01	1,06	1,11	1,18	1,26	1,35	1,47	1,62	1,78
1431	915	40	0,65	0,67	0,70	0,73	0,76	0,78	0,80	0,83	0,86	0,89	0,93	0,97	1,02	1,08	1,14	1,22	1,32	1,44
1508	978	42	0,59	0,62	0,64	0,67	0,68	0,70	0,72	0,74	0,77	0,80	0,83	0,86	0,89	0,94	0,98	1,04	1,11	1,19
1587	1026	44	0,54	0,56	0,59	0,61	0,62	0,63	0,65	0,66	0,68	0,70	0,73	0,75	0,78	0,82	0,85	0,89	0,92	0,97

Note: Consult factory for selections using other refrigerants.

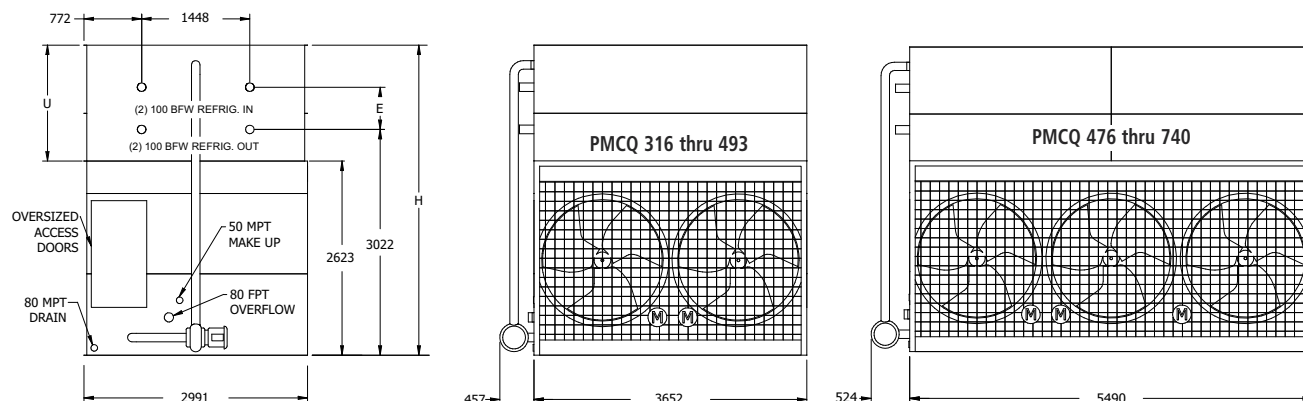
**Table 2 - Ammonia (R-717) Heat Rejection Factors**

Condensing Pres. (kPa)		Cond. Temp. °C	Wet Bulb Temperature, (°C)																	
			10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1063	30	0,95	1,03	1,12	1,23	1,31	1,40	1,51	1,63	1,79	1,99	2,24	2,56	3,00	—	—	—	—	—	—
1133	32	0,84	0,90	0,97	1,06	1,12	1,18	1,25	1,32	1,43	1,55	1,70	1,88	2,11	—	—	—	—	—	—
1206	34	0,76	0,81	0,86	0,93	0,98	1,02	1,07	1,12	1,19	1,28	1,36	1,48	1,61	1,80	2,06	—	—	—	—
1245	35	0,71	0,76	0,81	0,87	0,91	0,95	0,99	1,03	1,08	1,15	1,23	1,30	1,39	1,53	1,69	1,90	2,15	2,47	—
1284	36	0,69	0,73	0,77	0,82	0,86	0,89	0,92	0,96	1,01	1,07	1,13	1,20	1,28	1,39	1,53	1,70	1,91	2,17	—
1365	38	0,63	0,66	0,69	0,73	0,76	0,78	0,81	0,83	0,86	0,90	0,94	0,99	1,05	1,12	1,21	1,31	1,44	1,59	—
1451	40	0,58	0,60	0,62	0,65	0,67	0,70	0,72	0,74	0,76	0,80	0,83	0,87	0,91	0,96	1,02	1,09	1,18	1,29	—
1539	42	0,53	0,55	0,57	0,60	0,61	0,63	0,64	0,66	0,68	0,71	0,74	0,76	0,80	0,84	0,88	0,93	0,99	1,06	—
1630	44	0,49	0,50	0,52	0,54	0,56	0,56	0,58	0,59	0,61	0,63	0,65	0,67	0,70	0,73	0,76	0,79	0,83	0,86	—

**Table 3 - Unit Heat Rejection**

Model	kW Base	Model	kW Base	Model	kW Base	Model	kW Base	Model	kW Base	Model	kW Base
PMCQ-316	1361	PMCQ-530	2283	PMCQ-842	3627	PMCQ-1480	6376	PMCQ-761	3279	PMCQ-1070	4610
PMCQ-350	1508	PMCQ-566	2438	PMCQ-882	3800	PMCQ-399	1719	PMCQ-815	3511	PMCQ-1122	4834
PMCQ-367	1581	PMCQ-575	2477	PMCQ-916	3946	PMCQ-427	1840	PMCQ-845	3641	PMCQ-1206	5196
PMCQ-379	1633	PMCQ-604	2602	PMCQ-934	4024	PMCQ-463	1995	PMCQ-765	3296	PMCQ-1288	5549
PMCQ-380	1637	PMCQ-613	2641	PMCQ-986	4248	PMCQ-469	2020	PMCQ-809	3485	PMCQ-1308	5635
PMCQ-405	1745	PMCQ-655	2822	PMCQ-952	4101	PMCQ-510	2197	PMCQ-850	3662	PMCQ-1374	5919
PMCQ-407	1753	PMCQ-656	2826	PMCQ-1034	4455	PMCQ-535	2305	PMCQ-893	3847	PMCQ-1402	6040
PMCQ-410	1766	PMCQ-683	2942	PMCQ-1060	4567	PMCQ-561	2417	PMCQ-798	3438	PMCQ-1472	6341
PMCQ-434	1870	PMCQ-694	2990	PMCQ-1132	4877	PMCQ-603	2598	PMCQ-854	3679	PMCQ-1522	6557
PMCQ-441	1900	PMCQ-740	3188	PMCQ-1150	4954	PMCQ-644	2775	PMCQ-908	3912	PMCQ-1550	6678
PMCQ-458	1973	PMCQ-734	3162	PMCQ-1212	5221	PMCQ-654	2818	PMCQ-926	3989	PMCQ-1630	7022
PMCQ-467	2012	PMCQ-760	3274	PMCQ-1226	5282	PMCQ-687	2960	PMCQ-938	4041	PMCQ-1690	7281
PMCQ-493	2124	PMCQ-810	3490	PMCQ-1312	5652	PMCQ-701	3020	PMCQ-972	4187	PMCQ-1618	6971
PMCQ-476	2051	PMCQ-820	3533	PMCQ-1366	5885	PMCQ-736	3171	PMCQ-1020	4394	PMCQ-1786	7694

### MODELS PMQC 316 THRU 740



**Table 4 Engineering Data**

Model No.	Fans		Weights (kg)			NH <sub>3</sub> Operating Charge (kg)**	Coil Volume (l)	Spray Pump		Remote Sump			Dimensions (mm)		
	Motor (kW)	Air Flow (m <sup>3</sup> /s)	Shipping	Operating	Heaviest Section†			(kW)	(l/s)	Liters Req'd*	Conn. Size	Operating Weight (kg)	Height H	Upper U	Coil Distance E
PMQC-316	(2) 4	26	6.055	7.905	3.895 (C)	115	963	4,0	43,2	1.893	250	7.600	4150	1549	565
PMQC-350	(2) 5.5	29	6.105	7.955	3.895 (C)	115	963	4,0	43,2	1.893	250	7.650	4150	1549	565
PMQC-367	(2) 4	25	7.795	9.715	5.635 (C)	185	1557	4,0	43,2	1.893	250	9.410	4582	1981	997
PMQC-379	(2) 7.5	32	6.120	7.970	3.895 (C)	115	963	4,0	43,2	1.893	250	7.660	4150	1549	565
PMQC-380	(2) 5.5	29	7.000	8.885	4.790 (C)	145	1246	4,0	43,2	1.893	250	8.575	4366	1765	781
PMQC-405	(2) 5.5	29	7.845	9.765	5.635 (C)	185	1557	4,0	43,2	1.893	250	9.455	4582	1981	997
PMQC-407	(2) 11	37	6.235	8.090	3.895 (C)	115	963	4,0	43,2	1.893	250	7.780	4150	1549	565
PMQC-410	(2) 7.5	32	7.015	8.900	4.790 (C)	145	1246	4,0	43,2	1.893	250	8.590	4366	1765	781
PMQC-434	(2) 7.5	32	7.855	9.780	5.635 (C)	185	1557	4,0	43,2	1.893	250	9.470	4582	1981	997
PMQC-441	(2) 11	37	7.130	9.015	4.790 (C)	145	1246	4,0	43,2	1.893	250	8.710	4366	1765	781
PMQC-458	(2) 7.5	31	8.740	10.695	6.520 (C)	220	1869	4,0	43,2	1.893	250	10.385	4797	2197	1213
PMQC-467	(2) 11	36	7.975	9.895	5.635 (C)	185	1557	4,0	43,2	1.893	250	9.590	4582	1981	997
PMQC-493	(2) 11	36	8.860	10.815	6.520 (C)	220	1869	4,0	43,2	1.893	250	10.505	4797	2197	1213
PMQC-476	(3) 4	39	9.215	12.085	5.705 (C)	165	1416	5,5	65	2.347	300	11.085	4150	1549	565
PMQC-530	(3) 5.5	44	9.290	12.155	5.705 (C)	165	1416	5,5	65	2.347	300	11.160	4150	1549	565
PMQC-566	(3) 7.5	49	9.310	12.180	5.705 (C)	165	1416	5,5	65	2.347	300	11.180	4150	1549	565
PMQC-575	(3) 5.5	44	10.620	13.540	7.035 (C)	220	1869	5,5	65	2.347	300	12.540	4366	1765	781
PMQC-604	(3) 11	56	9.490	12.355	5.705 (C)	165	1416	5,5	65	2.347	300	11.360	4150	1549	565
PMQC-613	(3) 7.5	48	10.640	13.560	7.035 (C)	220	1869	5,5	65	2.347	300	12.565	4366	1765	781
PMQC-655	(3) 11	55	10.820	13.740	7.035 (C)	220	1869	5,5	65	2.347	300	12.740	4366	1765	781
PMQC-656	(3) 7.5	47	11.920	14.890	8.315 (C)	270	2322	5,5	65	2.347	300	13.895	4582	1981	997
PMQC-683	(3) 7.5	47	13.250	16.275	9.645 (C)	325	2775	5,5	65	2.347	300	15.275	4797	2197	1213
PMQC-694	(3) 11	54	12.095	15.070	8.315 (C)	270	2322	5,5	65	2.347	300	14.070	4582	1981	997
PMQC-740	(3) 11	54	13.425	16.450	9.645 (C)	325	2775	5,5	65	2.347	300	15.455	4797	2197	1213

† (C) = Casing (P) = Pan

\* Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation. (300 mm would normally be sufficient.)

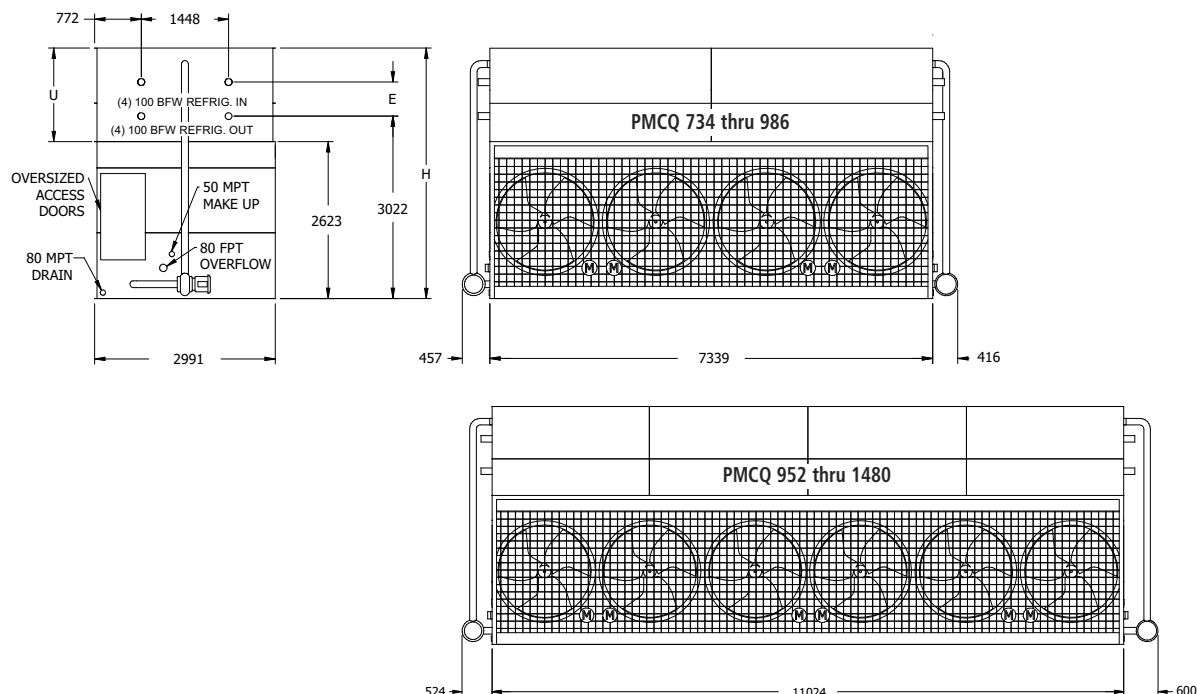
\*\* Refrigerant charge is shown for R-717. Multiply by 1.93 for R-22 and 1.98 for R-134a. Dimensions are subject to change. Do not use for pre-fabrication.



# ENGINEERING DATA & DIMENSIONS

# PMCQ

## MODELS PMCQ 734 THRU 1480



**Table 5 Engineering Data**

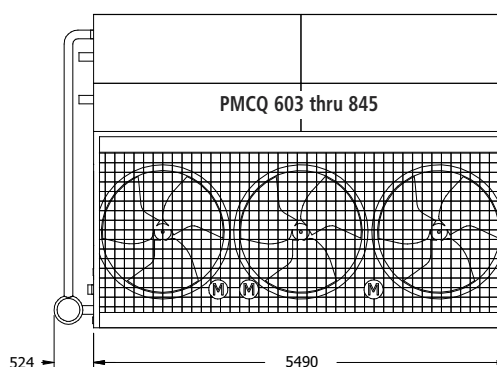
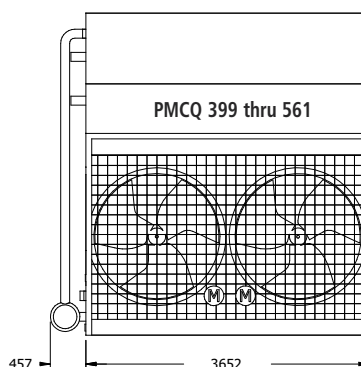
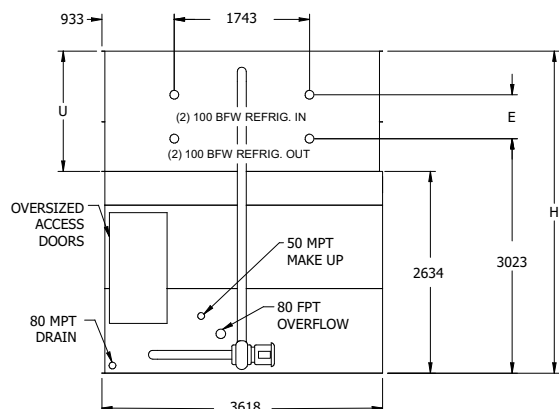
Model No.	Fans		Weights (kg)			NH <sub>3</sub> Operating Charge (kg)**	Coil Volume (l)	Spray Pump		Remote Sump			Dimensions (mm)		
	Motor (kW)	Air Flow (m <sup>3</sup> /s)	Shipping	Operating	Heaviest Section†			(kW)	(l/s)	Liters Req'd*	Conn. Size	Operating Weight (kg)	Height H	Upper U	Coil Distance E
PMCQ-734	(4) 4	50	15.800	19.810	5590 (C)	365	3115	(2) 4	86,4	3.520	300	18.840	4582	1981	997
PMCQ-760	(4) 5.5	58	14.115	18.055	4715 (P)	295	2520	(2) 4	86,4	3.520	300	17.080	4366	1765	781
PMCQ-810	(4) 5.5	57	15.895	19.905	5590 (C)	365	3115	(2) 4	86,4	3.520	300	18.935	4582	1981	997
PMCQ-820	(4) 7.5	64	14.145	18.080	4745 (P)	295	2520	(2) 4	86,4	3.520	300	17.110	4366	1765	781
PMCQ-842	(4) 5.5	56	17.755	21.830	6520 (C)	435	3710	(2) 4	86,4	3.520	300	20.860	4797	2197	1213
PMCQ-882	(4) 11	73	14.385	18.320	4985 (P)	295	2520	(2) 4	86,4	3.520	300	17.350	4366	1765	781
PMCQ-916	(4) 7.5	62	17.780	21.860	6520 (C)	435	3710	(2) 4	86,4	3.520	300	20.890	4797	2197	1213
PMCQ-934	(4) 11	72	16.160	20.170	5590 (C)	365	3115	(2) 4	86,4	3.520	300	19.200	4582	1981	997
PMCQ-986	(4) 11	71	18.020	22.100	6520 (C)	435	3710	(2) 4	86,4	3.520	300	21.130	4797	2197	1213
PMCQ-952	(6) 4	77	17.755	23.635	6685 (P)	335	2832	(2) 5.5	130	5.299	350	22.150	4150	1549	565
PMCQ-1034	(6) 4	76	20.530	26.515	6920 (C)	440	3738	(2) 5.5	130	5.299	350	25.035	4366	1765	781
PMCQ-1060	(6) 5.5	88	17.895	23.775	6825 (P)	335	2832	(2) 5.5	130	5.299	350	22.290	4150	1549	565
PMCQ-1132	(6) 7.5	98	17.940	23.825	6870 (P)	335	2832	(2) 5.5	130	5.299	350	22.335	4150	1549	565
PMCQ-1150	(6) 5.5	87	20.670	26.660	6920 (C)	440	3738	(2) 5.5	130	5.299	350	25.175	4366	1765	781
PMCQ-1212	(6) 5.5	86	23.345	29.445	8260 (C)	545	4644	(2) 5.5	130	5.299	350	27.955	4582	1981	997
PMCQ-1226	(6) 7.5	96	20.715	26.705	6920 (C)	440	3738	(2) 5.5	130	5.299	350	25.220	4366	1765	781
PMCQ-1312	(6) 7.5	95	23.390	29.490	8260 (C)	545	4644	(2) 5.5	130	5.299	350	28.000	4582	1981	997
PMCQ-1366	(6) 7.5	93	26.160	32.360	9645 (C)	650	5550	(2) 5.5	130	5.299	350	30.870	4797	2197	1213
PMCQ-1480	(6) 11	107	26.510	32.715	9645 (C)	650	5550	(2) 5.5	130	5.299	350	31.225	4797	2197	1213

† (C) = Casing (P) = Pan

\* Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation. (300 mm would normally be sufficient.)

\*\* Refrigerant charge is shown for R-717. Multiply by 1.93 for R-22 and 1.98 for R-134a. Dimensions are subject to change. Do not use for pre-fabrication.

### MODELS PMcq 399 THRU 845



**Table 6 Engineering Data**

Model No.	Fans		Weights (kg)			NH <sub>3</sub> Operating Charge (kg)**	Coil Volume (l)	Spray Pump		Remote Sump			Dimensions (mm)		
	Motor (kW)	Air Flow (m <sup>3</sup> /s)	Shipping	Operating	Heaviest Section†			(kW)	(l/s)	Liters Req'd*	Conn. Size	Operating Weight (kg)	Height H	Upper U	Coil Distance E
PMcq-399	(2) 5.5	35	7.050	9.335	4.520 (C)	140	1189	4,0	50,5	2.158	250	8.870	4150	1549	565
PMcq-427	(2) 7.5	38	7.060	9.350	4.520 (C)	140	1189	4,0	50,5	2.158	250	8.880	4150	1549	565
PMcq-463	(2) 7.5	37	8.145	10.480	5.605 (C)	180	1557	4,0	50,5	2.158	250	10.010	4366	1765	781
PMcq-469	(2) 11	43	7.185	9.470	4.520 (C)	140	1189	4,0	50,5	2.158	250	9.005	4150	1549	565
PMcq-510	(2) 11	42	8.270	10.600	5.605 (C)	180	1557	4,0	50,5	2.158	250	10.135	4366	1765	781
PMcq-535	(2) 11	42	9.300	11.670	6.635 (C)	225	1926	4,0	50,5	2.158	250	11.205	4582	1981	997
PMcq-561	(2) 11	41	10.310	12.730	7.650 (C)	270	2294	4,0	50,5	2.158	250	12.260	4797	2197	1213
PMcq-603	(3) 5.5	53	10.725	14.050	6.770 (C)	205	1756	5,5	75,7	2.782	300	12.845	4150	1549	565
PMcq-644	(3) 7.5	56	10.750	14.075	6.770 (C)	205	1756	5,5	75,7	2.782	300	12.870	4150	1549	565
PMcq-654	(3) 5.5	52	12.345	15.740	8.385v	270	2294	5,5	75,7	2.782	300	14.535	4366	1765	781
PMcq-687	(3) 5.5	51	13.905	17.365	9.945 (C)	335	2860	5,5	75,7	2.782	300	16.155	4582	1981	997
PMcq-701	(3) 7.5	55	12.370	15.760	8.385 (C)	270	2294	5,5	75,7	2.782	300	14.555	4366	1765	781
PMcq-736	(3) 7.5	54	13.930	17.385	9.945 (C)	335	2860	5,5	75,7	2.782	300	16.180	4582	1981	997
PMcq-761	(3) 11	63	12.545	15.940	8.385 (C)	270	2294	5,5	75,7	2.782	300	14.735	4366	1765	781
PMcq-815	(3) 11	63	14.105	17.565	9.945 (C)	335	2860	5,5	75,7	2.782	300	16.355	4582	1981	997
PMcq-845	(3) 11	62	15.565	19.085	11.405 (C)	400	3426	5,5	75,7	2.782	300	17.880	4797	2197	1213

† (C) = Casing (P) = Pan

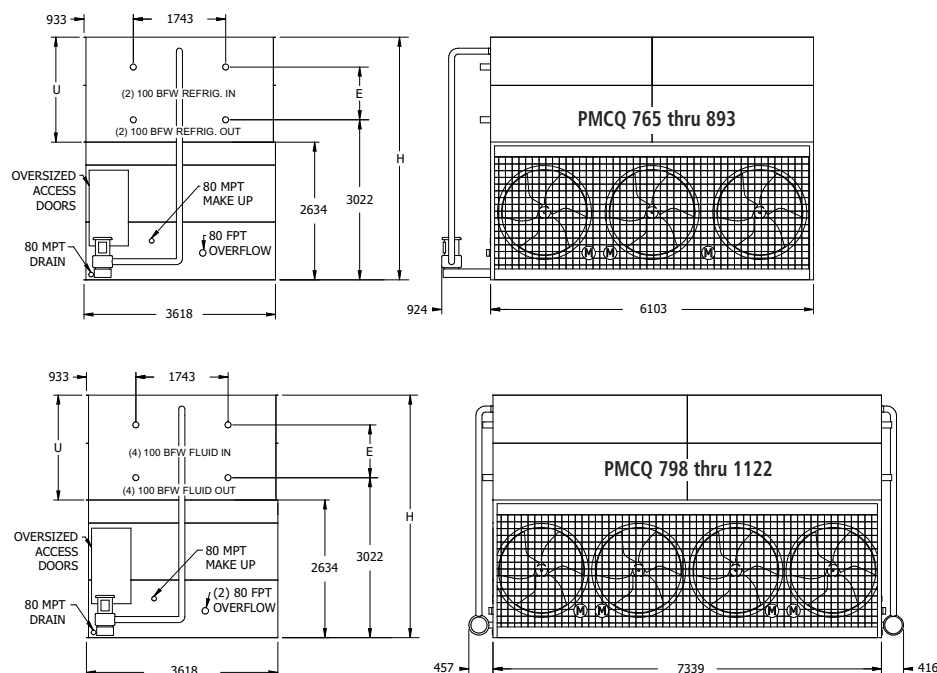
\* Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation. (300 mm would normally be sufficient.)

\*\* Refrigerant charge is shown for R-717. Multiply by 1.93 for R-22 and 1.98 for R-134a. Dimensions are subject to change. Do not use for pre-fabrication.

# ENGINEERING DATA & DIMENSIONS

# PMCQ

## MODELS PMCQ 765 THRU 893 MODELS PMCQ 798 THRU 1122



**Table 7 Engineering Data**

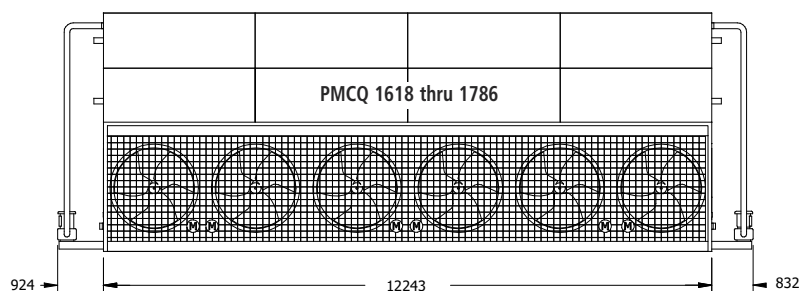
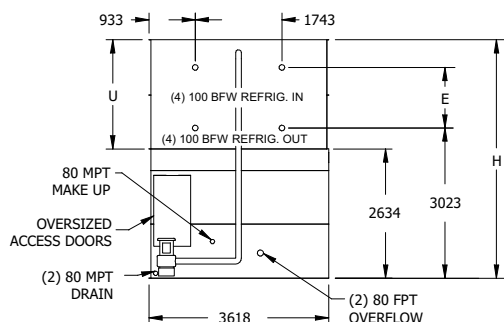
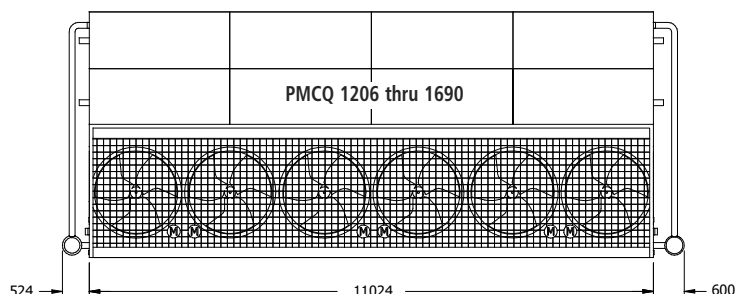
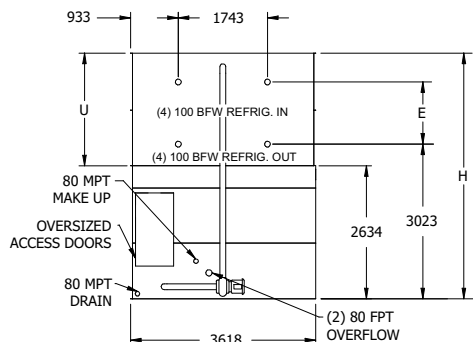
Model No.	Fans		Weights (kg)			NH <sub>3</sub> Operating Charge (kg)**	Coil Volume (l)	Spray Pump		Remote Sump			Dimensions (mm)		
	Motor (kW)	Air Flow (m <sup>3</sup> /s)	Shipping	Operating	Heaviest Section†			(kW)	(l/s)	Liters Req'd*	Conn. Size	Operating Weight (kg)	Height H	Upper U	Coil Distance E
PMCQ-765	(3) 7.5	58	15.220	19.150	10.940 (C)	370	3171	7,5	88,3	3.085	350	17.795	4582	1981	997
PMCQ-809	(3) 7.5	57	17.065	21.070	12.785 (C)	445	3794	7,5	88,3	3.085	350	19.715	4797	2197	1213
PMCQ-850	(3) 11	66	15.395	19.330	10.940 (C)	370	3171	7,5	88,3	3.085	350	17.970	4582	1981	997
PMCQ-893	(3) 11	65	17.240	21.245	12.785 (C)	445	3794	7,5	88,3	3.085	350	19.890	4797	2197	1213
PMCQ-798	(4) 5.5	70	13.785	18.490	5.040 (P)	275	2350	(2) 4	100,9	4.088	350	17.220	4150	1549	565
PMCQ-854	(4) 7.5	75	13.810	18.515	5.065 (P)	275	2350	(2) 4	100,9	4.088	350	17.245	4150	1549	565
PMCQ-908	(4) 5.5	68	18.220	23.100	6.590 (C)	450	3823	(2) 4	100,9	4.088	350	21.830	4582	1981	997
PMCQ-926	(4) 7.5	74	16.090	20.885	5.510 (C)	365	3087	(2) 4	100,9	4.088	350	19.615	4366	1765	781
PMCQ-938	(4) 11	86	14.050	18.755	5.305 (P)	275	2350	(2) 4	100,9	4.088	350	17.485	4150	1549	565
PMCQ-972	(4) 7.5	73	18.250	23.130	6.590 (C)	450	3823	(2) 4	100,9	4.088	350	21.860	4582	1981	997
PMCQ-1020	(4) 11	85	16.330	21.125	5.510 (C)	365	3087	(2) 4	100,9	4.088	350	19.855	4366	1765	781
PMCQ-1070	(4) 11	84	18.490	23.370	6.590 (C)	450	3823	(2) 4	100,9	4.088	350	22.100	4582	1981	997
PMCQ-1122	(4) 11	82	20.600	25.570	7.650 (C)	540	4559	(2) 4	100,9	4.088	350	24.300	4797	2197	1213

† (C) = Casing (P) = Pan

\* Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation. (300 mm would normally be sufficient.)

\*\* Refrigerant charge is shown for R-717. Multiply by 1.93 for R-22 and 1.98 for R-134a. Dimensions are subject to change. Do not use for pre-fabrication.

### MODELS PMQC 1206 THRU 1786



**Table 8 Engineering Data**

Model No.	Fans		Weights (kg)			NH <sub>3</sub> Operating Charge (kg)**	Coil Volume (l)	Spray Pump		Remote Sump			Dimensions (mm)		
	Motor (kW)	Air Flow (m <sup>3</sup> /s)	Shipping	Operating	Heaviest Section†			(kW)	(l/s)	Liters Req'd*	Conn. Size	Operating Weight (kg)	Height H	Upper U	Coil Distance E
PMQC-1206	(6) 5.5	105	20.515	27.505	7.355 (P)	410	3483	(2) 5.5	151.4	5.526	400	24.945	4150	1549	565
PMQC-1288	(6) 7.5	112	20.555	27.545	7.395 (P)	410	3483	(2) 5.5	151.4	5.526	400	24.985	4150	1549	565
PMQC-1308	(6) 5.5	104	23.875	30.995	8.260 (C)	540	4616	(2) 5.5	151.4	5.526	400	28.430	4366	1765	781
PMQC-1374	(6) 5.5	102	27.120	34.375	9.885 (C)	670	5720	(2) 5.5	151.4	5.526	400	31.805	4582	1981	997
PMQC-1402	(6) 7.5	110	23.915	31.035	8.260 (C)	540	4616	(2) 5.5	151.4	5.526	400	28.470	4366	1765	781
PMQC-1472	(6) 7.5	109	27.160	34.415	9.885 (C)	670	5720	(2) 5.5	151.4	5.526	400	31.845	4582	1981	997
PMQC-1522	(6) 11	127	24.270	31.395	8.260 (C)	540	4616	(2) 5.5	151.4	5.526	400	28.830	4366	1765	781
PMQC-1550	(6) 7.5	107	30.200	37.585	11.405 (C)	805	6824	(2) 5.5	151.4	5.526	400	35.015	4797	2197	1213
PMQC-1630	(6) 11	125	27.520	34.770	9.885 (C)	670	5720	(2) 5.5	151.4	5.526	400	32.205	4582	1981	997
PMQC-1690	(6) 11	123	30.560	37.945	11.405 (C)	805	6824	(2) 5.5	151.4	5.526	400	35.375	4797	2197	1213
PMQC-1618	(6) 7.5	114	33.740	41.870	12.875 (C)	890	7589	(2) 7.5	176.7	6.170	400	39.045	4797	2197	1213
PMQC-1786	(6) 11	131	34.095	42.230	12.875 (C)	890	7589	(2) 7.5	176.7	6.170	400	39.405	4797	2197	1213

† (C) = Casing (P) = Pan

\* Liters shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation. (300 mm would normally be sufficient.)

\*\* Refrigerant charge is shown for R-717. Multiply by 1.93 for R-22 and 1.98 for R-134a. Dimensions are subject to change. Do not use for pre-fabrication.



# ENGINEERING DATA & DIMENSIONS

## Applications

EVAPCO units are heavy-duty construction and designed for long trouble-free operation. Proper equipment selection, installation and maintenance is, however, necessary to ensure good unit performance. Some of the major considerations in the application of a condenser are presented below. For additional information, contact the factory.

## Air Circulation

In reviewing the system design and unit location, it is important that proper air circulation be provided. The best location is on an unobstructed roof top or on ground level away from walls and other barriers. Care must be taken when locating condensers in wells or enclosures or next to high walls. The potential for recirculation of hot, moist discharge air back into the fan intake exists. Recirculation raises the wet bulb temperature of the entering air causing the condensing pressure to rise above the design. For these cases, a discharge hood or ductwork should be provided to raise the overall unit height even with the adjacent wall, thereby reducing the chance of recirculation. Good engineering practice dictates that the evaporative condenser's discharge air not be directed or located close to or in the vicinity of building air intakes. Engineering assistance is available from the factory to identify potential recirculation problems and recommend solutions.

For additional information regarding layout of evaporative condensers, see EVAPCO Bulletin entitled *"Equipment Layout"*.

## Piping

Condenser piping should be designed and installed in accordance with generally accepted engineering practice. All piping should be anchored by properly designed hangers and supports with allowance made for possible expansion and contraction. No external loads should be placed upon condenser connections, nor should any of the pipe supports be anchored to the unit framework. For additional information concerning refrigerant pipe sizing and layout, see EVAPCO Bulletin entitled *"Piping Evaporative Condensers"*.

## Bleed-off

Each unit supplied with a pump mounted on the side is furnished with a clear bleed line for visual inspection and a valve which, when fully open, will bleed-off the proper amount of water. If the make-up water supplying the unit is relatively free of impurities, it may be possible to cut back the bleed, but the unit must be checked frequently to make sure scale is not forming. Make-up water pressure should be maintained between 140 and 340 kPa.

## Water Treatment

In some cases the make-up will be so high in mineral content that a normal bleed-off will not prevent scaling. In this case water treatment will be required and a reputable water treatment company familiar with the local water conditions should be consulted.

Any chemical water treatment used must be compatible with the construction of the unit. If acid is used for treatment, it should be accurately metered and the concentration properly controlled. The pH of the water should be maintained between 6.5 and 8.3. **Units constructed of galvanized steel operating with circulating water having a pH of >8.3 or higher will require periodic passivation of the galvanized steel to prevent the formation of "white rust".** Batch chemical feeding is not recommended because it does not afford the proper degree of control. If acid cleaning is required extreme caution must be exercised and only inhibited acids recommended for use with galvanized construction **should be used. For more information see EVAPCO Bulletin entitled "Maintenance Instructions".**

## Control of Biological Contamination

Water quality should be checked regularly for biological contamination. If biological contamination is detected, a more aggressive water treatment and mechanical cleaning program should be undertaken. The water treatment program should be performed in conjunction with a qualified water treatment company. It is important that all internal surfaces be kept clean of accumulated dirt and sludge. In addition, the drift eliminators should be maintained in good operating condition.

## 1.0 FORCED DRAFT PMQCQ CONDENSER

### 1.1 General

Furnish and install factory assembled condenser of blow through, counterflow design with a horizontal single air side entry and a vertical air discharge. The unit shall be completely factory assembled and conform to the specifications and schedules.

The total fan power should not exceed \_\_\_\_ kW and the total overall unit dimensions should not exceed the following :

Length : mm  
Width : mm  
Height : mm

The unit will be delivered in two parts : the bottom section (pan-fan) and the top section (heat transfer). The unit (top and bottom section) shall be joined together with elastic sealer and bolted together with corrosion resistance fasteners.

Approved manufacturer : Evapco – model PMQCQ \_\_\_\_\_

### 1.2 Thermal Performance – Performance Warranty

The condenser shall be capable of performing the thermal duties as shown in the data sheets and on drawings.

### 1.3 Applicable Standards

ATC 128 Test Code for Measurement of Sound from Water Cooling Towers

### 1.4 Submittals

- The manufacturer shall submit a five year history of the proposed type of cooling tower with a minimum of 10 installations for similar sized equipment.
- Shop drawings : submit shop drawings indicating dimensions, weight loadings and required clearances.
- Product data : submit manufacturers technical product data, original selection printouts and clearance requirements.
- Complete noise data sheet for the selected condenser.
- Maintenance data for condenser and accessories.
- The condenser manufacturer shall provide factory test run certificates of the fans and fan motor.

### 1.5 Product Delivery – Storage and Handling

- The contractor shall make the provisions for proper storage at site before installation and handle the product per the instructions of the manufacturer.
- Once installed provide the necessary measures that the units remain clean and protected from any dust and mechanical damage.

### 1.6 Quality Assurance

- The manufacturer shall have a quality assurance system in place which is certified by an accredited registrar and complying with the requirements of ISO 9000. This is to guarantee a consistent level of product and service quality.
- Manufacturers without ISO 9001 certification are not acceptable.

### 1.7 Warranty

- The products will be warranted for a period of minimum one year from start up date or eighteen months from the date of shipment, whichever comes first.

## 2.0 PRODUCT

### 2.1 Construction – Corrosion Resistance

- The structure and all steel elements of the pan and casing shall be constructed of Z 725 hot dip galvanized steel for long life and durability. Alternatives with lower zinc layer thickness and external paint or coating are not accepted as equal.
- The strainer shall be made of stainless steel type 304.
- During fabrication all panel edges shall be coated with a 95 % pure zinc compound.

### OPTIONAL EXECUTION – BASIN IN SST 304

#### 2.1. Construction – Corrosion Resistance

- The structure and all steel elements of the pan up to the water level shall be made of SST 304.
- Alternatives with hot dip galvanized steel and epoxy coatings in lieu of the SST 304 are not considered equal and accepted.
- All other steel components and the casing shall be constructed of Z 725 hot dip galvanized steel for long life and durability. Alternatives with lower zinc layer thickness and external paint or coating are not accepted as equal.
- The strainer shall be made of stainless steel type 304.
- During fabrication all galvanized steel panel edges shall be coated with a 95 % pure zinc compound.

### OPTIONAL EXECUTION – Complete Unit SST 304 (except moving parts)

#### 2.1. Construction – Corrosion Resistance

- The structure and all steel elements shall be made of SST 304.
- Alternatives with hot dip galvanized steel and epoxy coatings to replace the SST 304 are not considered equal and accepted.

#### 2.2 Pan / Fan section

- The heat transfer section shall be removable from the pan to provide easy handling and rigging.
- The pan – fan section shall include fans and drives mounted and aligned in the factory. These items shall be located in the dry air stream.
- Standard pan accessories shall include strainer(s) of anti vortex design, brass make up valve with unsinkable plastic float arranged for easy adjustment.
- Access Door: a man-sized rectangular access door shall be located above the basin to allow for easy access to the pan interior.

#### 2.3 Mechanical Equipment

##### 2.3.1 Fan(s)

- Type and Material: axial propeller, one piece heavy duty FRP hub and blade construction. Galvanized steel closely fitted fan cowl with venturi air inlet for maximum fan efficiency, covered with a heavy gauge hot-dip galvanized steel fan guard. (Optional Type 304 stainless steel).
- Fan Housing: the complete drive system, including the electric motor, belts, bearings, fan, and drives shall be completely enclosed in a protective housing which covers the drive system and provides sound reduction.
- Maximum sound pressure level of \_\_\_\_\_dB(A) at \_\_\_\_\_m.

# SPECIFICATIONS

## 2.3.2 Bearings and Drive

- a) The fan shaft (s) shall be supported by heavy duty , self aligning pillow block bearings with cast iron housings and lubrication fittings for maintenance.
- b) The fan drives shall be V belt type with taper lock sheaves designed for 150 % of the motor nameplate horsepower.

## 2.3.3 Motor

- a) The fan motor shall be Totally Enclosed , Fan Cooled (TEFC) , squirrel cage, ball bearing type motor.
- b) The motor shall be minimum IP 55 degree of protection, Class F insulation, Service Factor 1 and selected for the appropriate cooling tower duty and the correct ambient temperature but minimum 40°C.
- c) Motor bearings shall be greased for life or external grease lines shall be provided.
- d) The motor shall be mounted on an adjustable heavy duty steel motor base.
- e) The motor power supply shall be \_\_\_\_ volts, \_\_\_\_ hertz and \_\_\_\_ phase.

## 2.4. Casing Section

### 2.4.1 Heat Transfer Coil

- a) The coil(s) shall be all prime surface steel, encased in steel framework with the entire assembly hot-dip galvanized after fabrication. Coil(s) shall be designed with sloping elliptical tubes for free drainage of liquid refrigerant and air pressure tested under water in accordance with the PED 97/23/EC directive.

### 2.4.2 Water Distribution

- a) The spray header and branches shall be constructed of Schedule 40, Polyvinyl Chloride (PVC) pipe for corrosion resistance and shall have a steel connection to attach the external piping.
- b) The internal water distribution piping shall be easily removable for cleaning purposes.
- c) The branches have end caps to assist with debris removal.
- d) The water shall be distributed over the fill by precision molded ABS spray nozzles with large minimum 1 inch orifice openings to eliminate clogging.
- e) The nozzles shall be threaded into the water distribution piping to assure positive positioning. The nozzles allow larger debris to flow easily through the water distribution system.
- f) Water Recirculation Pump: the pump(s) shall be a close-coupled, centrifugal type with mechanical seal, installed at the factory. \_\_\_\_ kW totally enclosed, motor shall be furnished suitable for outdoor service on \_\_\_\_ volts, \_\_\_\_ hertz, and \_\_\_\_ phase.

### 2.4.3 Drift Eliminators

- a) The drift eliminators shall be constructed entirely inert polyvinyl (PVC) that has been specially treated to resist ultra violet light.
- b) Assembled in easily handled sections , the eliminator blades shall be spaced on 1 inch centers and shall incorporate three changes in air direction to assure efficient removal of entrained moisture from the discharge air stream.
- c) The maximum drift rate shall not exceed 0,001 % of the recirculated water rate.
- d) The drift eliminators shall be Eurovent OM-14-2009 certified.

## 3.0 ACCESSORIES (optional)

### 3.1 Electric Heaters

- a) The just remove cold water basin shall be provided with a electric heater package to prevent freezing of the water in the cold water basin.
- b) The electric heater package includes : electric heater elements and a combination of thermostat and low water level cutoff.
- c) The heaters shall be selected to maintain 4°C basin water temperature at \_\_\_\_ °C ambient
- d) The heater(s) shall be \_\_\_\_ V / \_\_\_\_ phase / \_\_\_\_ Hz electric power supply.

### 3.2 Three Probe Electric Water Level Control Package

- a) The condenser manufacturer shall provide an electric water level control package instead of the mechanical float valve arrangement.
- b) The package consist of the following elements :
  - Multiple heavy duty stainless steel SST 316 static probes mounted in a stilling tube outside the unit. Electrodes or sensors mounted inside the unit are not accepted as there operation will disturbed by the moving water in the basin.
  - A ABS , IP 56 case contains all the contactors for the different level probes and will provide a output signal of a relay for automatic filling and one relay for alarm level.
  - The power supply to the control package is 24 Vac / 230 Vac - \_\_\_\_ Hz .
  - A weather protected solenoid valve for the water make up ready for Piping to a water supply with pressure between 140 kPa and 340 kPa.

### 3.5 Vibration Switch

- a) A vibration limit switch shall be installed on the mechanical equipment support and wired into the control panel. The purpose of this switch will be interrupt power to the motor in the event of excessive vibration.
- b) The switch shall be adjustable for sensitivity, and shall require manual reset.



**Evapco Products are Manufactured Worldwide**



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